

(19)



Europäisches Patentamt  
European Patent Office  
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(11) Publication number:

**0 541 093 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(21) Application number: 92118981.7

(51) Int. Cl.<sup>5</sup>: **B65D 33/16, B65D 33/34,  
B65D 33/25**

(22) Date of filing: 05.11.92

(30) Priority: 08.11.91 JP 293151/91  
27.02.92 JP 41023/92  
19.03.92 JP 63793/92  
14.07.92 JP 186817/92

(43) Date of publication of application:  
12.05.93 Bulletin 93/19

(84) Designated Contracting States:  
AT CH DE FR GB IT LI

(71) Applicant: **TOYO ALUMINIUM KABUSHIKI  
KAISHA**  
6-8, Kyutaro-machi 3-chome Chuō-ku  
Osaka-shi Osaka-fu(JP)

(72) Inventor: Ibi, Masaei  
225, Sanno-cho  
Isesaki-shi, Gunma(JP)  
Inventor: Sekiguchi, Tomonobu  
272-2, Nishi 2-cho, Funao-cho, Hamadera

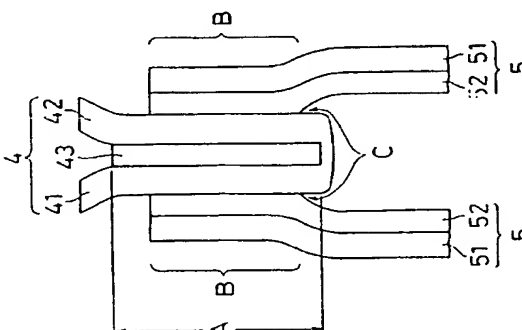
**Sakai-shi, Osaka(JP)**  
Inventor: Yamamoto, Masashi  
554, Tsuchiyama, Hiraoka-cho  
Kakogawa-shi, Hyogo(JP)  
Inventor: Andoh, Noboru  
No. 205, 4-7-6, Matsuba-cho  
Kashiwa-shi, Chiba(JP)  
Inventor: Kamada, Mamoru, No. 203, Daini  
Eiwa Building  
4-25-7, Utsukushigaoka, Midori-ku  
Yokohama-shi, Kanagawa(JP)  
Inventor: Itakura, Kenichi  
3-21-31, Hongodai, Sakae-ku  
Yokohama-shi, Kanagawa(JP)

(74) Representative: Glawe, Delfs, Moll & Partner  
Patentanwälte  
Postfach 26 01 62  
W-8000 München 26 (DE)

(54) **Package capable of being sealed by heat-fusing.**

(57) A packaging pouch (1) having a laminate (4) of easily peelable tapes secured by heat-bonding to laminates (5) of the package body where an opening of the package is to be formed. The former laminate (4) has outer heat-bonding layers (41,42) heat-fusible to the heat-sealing layers (52) of the latter laminates (5). The bond strength between the heat-bonding layers (41,42) are adjusted such that they can be peeled from each other by hand. The former laminate (4) may be formed by co-extruding synthetic resins or by heat-bonding. The laminate (4) may protrude farther into the package body than the heat-sealed portion (B) of the package body.

FIG. 3



This invention relates to a package which is highly sealable, which can be opened easily by peeling and which can accommodate foods, medicines, electric parts and any other articles.

Heretofore, in order to open a hermetically sealed pouch having a content heat sealed therein, one of the following methods was used:

- 5 (1) breaking the heat - sealed portions, or
- (2) ripping open the pouch from a notch or similar rip - starting mark formed in the pouch beforehand in the pouch.

In order to form an opening according to the former method, the heat - sealing strength has to be rather low. Thus, it is neither applicable to pack a liquid or heavy substance nor to retort a package. Also, since  
10 the heat - sealing strength along the portion where the pouch is to be opened is not uniform, the pouch may not be opened smoothly. If one tries to open the pouch by force, it may get broken, so that the contents may scatter about and become useless.

With the latter method, ripping requires a considerable force and it is difficult to rip open the pouch in a desired direction, i.e. to open the pouch at a desired portion. This increases the possibility of the scattering  
15 of contents. In order to solve this problem, various proposals have been made, e.g. using a material which is orientated strongly in a direction substantially parallel to the direction in which the pouch is intended to be torn apart, forming perforations to restrict the tear direction, or using a plastic reinforcing material. These measures all push up the cost of the pouch and are still not very effective.

It is an object of this invention to provide an easy - to - open sealed package which can accommodate  
20 foods, medicines, electronic parts and any other goods, which can be easily opened by breaking the hermetically heat - sealed portion without the fear of scattering the contents around the package body.

According to this invention, a laminate of easily peelable tapes is secured by heat - fusing it to heat - sealing portion of the package body where an opening of the package is to be formed. The laminate comprises outer heat - bonding layers heat - fusible to the heat - sealing layers of the package body. The  
25 bond strength between the heat - bonding layers are adjusted such that they can be peeled from each other by hands.

The laminate of easily peelable tapes may be formed by co - extruding synthetic resins or by thermal bonding.

The laminate of easily peelable tapes may protrude farther into the package body than the heat - sealed  
30 portion of the package body.

The laminate of easily peelable tapes may have its inner end inside the package body covered by the heat - bonding layers.

A fastener comprising a male part and a female part may be provided inside or outside of the laminate of easily peelable tapes. It allows the package to be re - sealed even after it has been opened. It will not  
35 have any undue effect on any other property of the package.

By providing the laminate of easily peelable tapes at a portion where an opening is to be formed, the package can be opened easily from outside by hands. Also, when the package is heated in a microwave oven, ply separation will occur between the easily peelable tapes provided at the heat - sealing portion due to a sharp thermal expansion of water contained in the contents, so that the package can be opened  
40 automatically. When this happens, the contents in the sealing package would be pushed down and the package be deformed into a more stable shape. This prevents the contents from scattering about and soiling the surroundings.

On the other hand, the pouch is sealed by heat - fusing, the contents are sealed reliably. By having the laminate of easily peelable tapes protruding into the pouch body, its sealability can be increased further to  
45 such an extent that the package can withstand the impact when it is dropped.

The easy - to - open package according to the present invention has its laminate of easily peelable tapes inserted in the heat - sealing portion of the package body by heat - fusing. To open the package, the easily peelable layers are peeled from each other. Thus, the peeling strength is stable and the package can be opened very easily and without fail by hands or by the pressure increase in the package. The easily  
50 peelable tapes protrude farther inwardly than the heat - sealed portion. This arrangement serves to increase the compressive strength, drop impact strength and heat - sealing strength of the package.

Namely, the easy - to - open package according to this invention can be opened easily without fail, is sufficiently strong and is easy and convenient to handle. Further, it is fairly cheap.

Other features and objects of the present invention will become apparent from the following description  
55 taken with reference to the accompanying drawings, in which:

Fig. 1 is a front view of the pouch of one embodiment of this invention;

Fig. 2 is a front view of the pouch of another embodiment;

Fig. 3 is an enlarged vertical sectional view of the heat - sealed portion of the pouch of Fig. 1;

Fig. 4 is an enlarged vertical sectional view of the heat-sealed portion of the pouch of Fig. 2;  
 Figs. 5 and 6 are enlarged vertical sectional views of the heat-sealed portions of other embodiments of the pouch according to the present invention;  
 Fig. 7 is a sectional view of the laminate of easily peelable tapes;  
 Fig. 8 is a plan view showing coating patterns of the resin layer of the same;  
 Fig. 9 is a sectional view of the laminate of the pouch body;  
 Fig. 10 is a sectional view of another embodiment of the laminate of easily peelable tapes;  
 Fig. 11 is a sectional view of still another embodiment of the laminate of easily peelable tapes; and  
 Fig. 12 is a perspective view of a self-standing pouch.

Figs. 1 and 2 are front views of easy-to-open pouches 1. The pouches are heat-sealed at 2 to hermetically seal a content 3. At portion A, the heat-sealed portion 2 consists of the outer heat-bonding layer (to be described later) in a laminate 4 of tapes which can be peeled easily from each other and heat-sealing layers 5 which are parts of the pouch body.

Figs. 3 and 4 are sectional views of the heat-sealed portions of Figs. 1 and 2. As shown, the laminate 4 of tapes which can be peeled easily from each other is disposed between laminates 5 of the pouch body and heat-fused therebetween. If it is desired to avoid the contact between an easily peelable layer 43 and the content, the inner side end of the laminate 4 may be melted and hardened to cover the easily peelable layer 43 with outer heat-bonding layers 41 and 42. We have confirmed that this covering scarcely resists the breakage stress exerted when opening the pouch in a manner as will be described below.

Figs. 5 and 6 show the heat-sealed portions of other embodiments in which a fastener 10 comprising a male part 11 and a female part 12 is provided inside and outside, respectively, of the laminate 4. The fastener makes it possible to re-seal the package even after it has been opened.

Fig. 7 shows the structure of the laminate 4 of easily peelable tapes. It comprises layers 41 and 42 to be heat-fused to the laminates 5 of the pouch body and an easily peelable layer 43 interposed between the layers 41 and 42. Substrates 411 and 421 of the layers 41 and 42 should be made of polyester, nylon (trade name), polypropylene, polyethylene or a composite thereof. Their heat-bonding layers 412, 422 may be made of a resin heat-fusible to the laminates 5 of the pouch body, such as a polyolefin including polyethylene and polypropylene, an ethylene-vinyl acetate copolymer, polyester or polyamide. If the substrates 411 and 421 heat-fusible to the laminates 5 of the pouch body, the heat-bonding layers 412, 422 may be omitted. Printed layers or colored layers may be disposed between the substrates 411 and 412 or between 421 and 422.

The easily peelable layer 43 comprises a resin layer 431 and an adhesive layer 432. The resin layer 431 is made by pattern coating a material having a relatively low bond strength, such as vinyl resin, urethane resin, acrylic resin, methacrylic resin, polyamide resin, silicone resin or a mixture thereof. This layer may be in the form of patterns so that the non-coated portion will form dots (Fig. 8a), lines (Fig. 8b) or a lattice (Fig. 8c).

The adhesive layer 432 should be preferably made of an adhesive whose bond strength drops little even if subjected to retort sterilization treatment. Such adhesives include a two-part hardenable urethane adhesive for dry bonding which can produce reactants of known polyol components and isocyanate components.

A pressure-sensitive adhesive also can be used for the adhesive layer 432 and is not restricted to a specific type but may be any one of acrylic, rubber, vinyl and silicone types. But, the repeelable type is preferable to the permanent bond type. Also, for easiness in taking out the content, resealability of the pouch and the shock resistance, the adhesive having a high holding power but low in bond strength and tack is preferable.

Fig. 9 shows the structure of one of the laminates 5 of the pouch body shown in Figs. 3 and 4. It comprises a substrate 51 and a heat-sealing layer 52. The substrate 51 is a laminate consisting of a surface protective layer 511, a gas barrier layer 512 and a reinforcing layer 513. Printed layers or colored layers may be added. The laminates 5 may have a different structure according to their intended use. For example, the gas barrier layer 512 or the reinforcing layer 513 may be omitted or the relative position of the layers 512 and 513 may be reversed. The heat sealing layer 52 is typically made of a polyolefin or an ethylene-vinyl acetate copolymer but may be made of any other material so long as it is heat-fusible to the heat-bonding layers 412 and 422 of the laminate 4 of easily peelable tapes. If the substrate 51 has a heat fusibility, this layer 52 may be omitted.

As shown in Figs. 3 and 4, the laminate 4 of easily peelable tapes has its inner end protruding inwardly beyond the heat-sealing portions B. Also, as shown in Fig. 3, it may protrude outwardly from the pouch. In such a case, the laminate 4 should be separated into two parts at a portion outside the pouch. The portion of the easily peelable laminate 4 protruding from the pouch serves as finger pickup tabs. By pinching the

layers 41 and 42 with fingers and pulling them in opposite directions, the easily peelable layer 43 will be broken, so that the pouch can be opened easily. In Fig. 3, the easily peelable layer 43 does not exist at the finger pickup tabs which comprises separated layers 41 and 42. But this layer may be provided over the entire length of the layers 41 and 42 and the pickup tabs may be formed later by partially removing the layer 43.

Also, the inwardly protruding portion of the laminate 4 of easily peelable tapes serves to increase the compressive strength, drop impact strength and heat-sealing strength of the pouch. Since these stresses concentrate on the heat-fused portion C, normal internal pressure cannot break the easily peelable layer 43. The presence of the protruding portion presumably serves to prevent the breakage of the layer 43.

Preferably, the laminate 4 protrudes inwardly into the pouch by a length of 1 - 30 mm.

It is possible to adjust the bond strength of the layer 43 to be in a range from about 10 to about 200 g/15 mm width so that the pouch will open automatically when the internal pressure rises sharply by heating the pouch in a microwave oven. In such a case, there is no need to have the easily peelable laminate 4 protruding outwardly from the pouch as shown in Fig. 3. Rather, it is preferable not to provide such protruding portion in order to prevent the pouch from being opened by mistake.

Figs. 10 and 11 show other embodiments of the laminate 4 of easily peelable tapes. The easily peelable laminate 4 in Fig. 10 is formed by co-extruding synthetic resin. Resins should be selected so that at least one of the interlaminar bond strength between layers 41 and 43, the interlaminar bond strength between layers 42 and 43 and the cohesive strength of the layer 43 is lower than the others.

The laminate 4 of easily peelable tapes in Fig. 11 is formed by laminating layers 41, 42 and 43 by thermal bonding. This embodiment is similar to the embodiment of Fig. 10 in that resins are selected so that at least one of the interlaminar bond strength between layers 41 and 43, the interlaminar bond strength between layers 42 and 43 and the cohesive strength of the layer 43 is lower than the others.

The laminate 4 may be formed first by laminating layers 41 and 43 or layers 42 and 43 together by dry bonding or by co-extrusion and then laminating the layer 42 or 41 thereon by thermal bonding. Also, instead of providing the easily peelable laminate 4 beforehand, materials 41, 42 and 43, prepared separately, may be inserted into the pouch and thermal-bonded together when forming the pouch.

In order to reduce the cohesion force of the easily peelable layer 43, a synthetic resin layer containing a large amount of inorganic filler may be provided.

In Figs. 1 and 2, the laminate 4 of easily peelable tapes is provided to extend the entire length of the upper part of the pouch 1. But it may be provided partially.

Figs. 1 and 2 show flat pouches. Fig. 12 shows a different embodiment in the form of a self-standing pouch. A laminate 4 of easily peelable tapes is inserted in the upper part of the self-standing pouch. In the figure, a heat-sealed portion 2a is provided on the back side of the pouch by the laminate 5 of the pouch body and the laminate 4 of easily peelable tapes. But no such heat-sealed portion similar to 2a is formed on the front side of the pouch. After putting a content into the pouch through this unsealed portion 100, a heat-sealing portion may be formed. In this embodiment, the heat-sealed portion 2a is formed beforehand on the back side of the pouch. But, this portion may also be formed after putting a content into the pouch.

The above embodiments are all related to pouches but this invention is also applicable to flexible bottles that are formed by blowing. In this case, too, a laminate 4 of easily peelable tapes is inserted in the bottle at a portion where the opening is to be formed and heat-sealed to the bottle.

Such an easy-to-open pouch can accommodate solid foods such as snacks, liquid foods such as soup, and foods comprising solid and liquid contents such as curry and gruel. It is particularly suited for accommodating liquid foods and liquid-solid mixed foods that are to be subjected to retort sterilization. This pouch can also accommodate medicines and electronic parts that are relatively heavy or have sharp parts.

We shall now describe experiments conducted on the easy-to-open pouch according to this invention.

#### [Experiment 1]

A flat pouch as shown in Figs. 1 and 3 were prepared. The laminate 4 of easily peelable tapes (see Fig. 7) comprises layers 411, 421 in the form of 25 $\mu$ m thick polyester films, layers 412, 422 in the form of 60 $\mu$ m thick non-orientated polypropylene, and a layer 431 made of an acrylic resin and formed by pattern coating in the pattern shown in Fig. 8a. The layer 432 is made of a two-part hardening type urethane dry bonding adhesive for retorting. The laminates 5 of the pouch body (see Fig. 9) comprise each a layer 511 in the form of a 12 $\mu$ m thick polyester film, a layer 512 in the form of a 7 $\mu$ m thick aluminum foil, a layer 513 in

the form of a 15 $\mu$ m thick nylon film and a layer 52 in the form of a 60 $\mu$ m thick non-orientated polypropylene film. The layers are laminated together by means of a two-part hardening type urethane dry bonding adhesive for retorting.

The following items were packed separately in the pouches and the pouches were sealed: tap water, curry on the market (packed in a retort pouch), Chinese sauce on the market (packed in a retort pouch) and compound sauce (salad oil: vinegar: tomato ketchup = 1:1:1). After subjecting them to retorting for 30 minutes at 121 C or for 10 minutes at 135 C, they were tested for heat-sealing strength, drop strength, compressive strength and leakage according to JIS Z 0238 test method B. The results are shown in Table 1. The pouches could be opened very easily without spilling the contents or getting the hands soiled with contents.

#### [Experiment 2]

Self-standing pouches as shown in Figs. 2 and 4 were prepared. The laminate 4 of easily peelable tapes (see Fig. 7) were made up of layers 411, 421 in the form of 25 $\mu$ m thick polyester films, layers 412, 422 in the form of 60 $\mu$ m thick non-orientated polypropylene film and a layer 431 formed by pattern coating an acrylic resin in the pattern shown in Fig. 8b. The layer 432 was made of a two-part hardening type urethane dry bonding adhesive for retorting. Each of the laminates 5 of the pouch body (see Fig. 9) was composed of a layer 511 in the form of a 12-micron thick polyester film, a layer 513 in the form of a 15-micron thick nylon film and a layer 52 in the form of a 60-micron thick non-orientated polypropylene film. The adjacent layers were laminated together by means of a two-part hardening type urethane dry bonding adhesive for retorting.

The following items were packed in these pouches and the pouches were sealed: tap water, curry on the market, cooking materials on the market for rice bowls and corn soup on the market, each 120g. After subjecting them to retort treatment for 30 minutes at 121 C, they were heated in a microwave oven. The test results are shown in Table 2. As for the spontaneous opening of the pouch, those having their laminates 4 protruding inwardly for a length of 30mm or less showed especially good results.

#### [Experiment 3]

In a similar structure to Experiment 2, an acrylic repeelable type adhesive was used for layer 432 and the layer 511 was a 25 $\mu$ m thick polyester film, layer 512 was a 7 $\mu$ m thick aluminum foil and layer 513 was a 25 $\mu$ m thick polyester film. These layers were laminated together using a two-part hardening type urethane dry bond adhesive.

The self-standable pouches thus obtained were filled with water and sealed. Their compressive strength and drop strength were measured. The pouches were heated in a microwave oven. The results are shown in Table 3. As for spontaneous opening, those having a length of protrusion of 30 mm or shorter showed good results.

Table 1

|    |                                   |                    |                  |                  |                  |                    |                  |                  |                  |
|----|-----------------------------------|--------------------|------------------|------------------|------------------|--------------------|------------------|------------------|------------------|
| 5  | Retort Condition                  | 121 °C, 30 minutes |                  |                  |                  | 135 °C, 10 minutes |                  |                  |                  |
|    | Content                           | Tap water          | Curry            | Chinese sauce    | Mixed sauce      | Tap water          | Curry            | Chinese sauce    | Mixed sauce      |
| 10 | Appearance                        | Nothing abnormal   | Nothing abnormal | Nothing abnormal | Nothing abnormal | Nothing abnormal   | Nothing abnormal | Nothing abnormal | Nothing abnormal |
|    | Heat seal strength (N/15 mm wide) | 44                 | 45               | 37               | 42               | 43                 | 40               | 42               | 39               |
| 15 | Drop strength                     | ○                  | ○                | ○                | ○                | ○                  | ○                | ○                | ○                |
|    | Compressive strength              | ○                  | ○                | ○                | ○                | ○                  | ○                | ○                | ○                |
| 20 | Leakage (B method)                | No leak            | No leak          | No leak          | No leak          | No leak            | No leak          | No leak          | No leak          |

Table 2

|    |   |                      |                            |                        |                     |
|----|---|----------------------|----------------------------|------------------------|---------------------|
| 25 | Length of protrusion into pouch (in mm) | Content              | Not subjected to retorting | Subjected to retorting |                     |
|    |   |                      | Spontaneous opening        | State after retort     | Spontaneous opening |
| 30 | 0                                       | Water                | ○                          | Leak found             |                     |
|    | 0                                       | Curry                | ○                          | Leak found             |                     |
|    | 0                                       | Material for domburi | ○                          | Leak found             |                     |
| 35 | 0                                       | Corn soup            | ○                          | Leak found             |                     |
|    | 1                                       | Corn soup            | ○                          | No leak                | ○                   |
|    | 3                                       | Corn soup            | ○                          | No leak                | ○                   |
| 40 | 5                                       | Corn soup            | ○                          | No leak                | ○                   |
|    | 10                                      | Corn soup            | ○                          | No leak                | ○                   |
|    | 15                                      | Corn soup            | ○                          | No leak                | ○                   |
| 45 | 20                                      | Corn soup            | ○                          | No leak                | ○                   |
|    | 25                                      | Corn soup            | ○                          | No leak                | ○                   |
|    | 30                                      | Corn soup            | ○                          | No leak                | ○                   |
| 50 | 35                                      | Corn soup            | X                          | No leak                | X                   |
|    | 40                                      | Corn soup            | X                          | No leak                | X                   |

Table 3

|    | Length of protrusion<br>into pouch (in mm) | Compressive strength | Drop strength | Spontaneous opening when<br>heated in microwave oven |
|----|--|----------------------|---------------|--|
| 5  | 0  | ○                    | Leak found    | ○  |
|    | 1  | ○                    | No leak       | ○  |
|    | 3  | ○                    | No leak       | ○  |
| 10 | 5  | ○                    | No leak       | ○  |
|    | 10   | ○                    | No leak       | ○  |
|    | 15   | ○                    | No leak       | ○  |
| 15 | 20   | ○                    | No leak       | ○  |
|    | 25   | ○                    | No leak       | ○  |
|    | 30   | ○                    | No leak       | ○  |
| 20 | 35   | ○                    | No leak       | X  |
|    | 40   | ○                    | No leak       | X  |

### Claims

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1. A package capable of being sealed by heat-fusing, characterized in that said package comprises a package body having a heat-sealing layer and a laminate of easily peelable tapes provided at a heat-sealed portion of the package where an opening is to be formed, said laminate of easily peelable tapes comprising outer heat-bonding layers heat-fusible to heat-sealing layers provided on the package body and an easily peelable layer disposed between said heat-bonding layers.
2. A package as claimed in claim 1 wherein said easily peelable layer comprises a resin layer pattern-coated on one of said outer heat-bonding layers and an adhesive layer covering said resin layer, said resin layer having a lower bond strength than said adhesive layer.
3. A package as claimed in claim 1 wherein said easily peelable layer comprises a resin layer pattern-coated on one of said outer heat-bonding layers and a pressure-sensitive adhesive layer covering said resin layer, said resin layer having a lower bond strength than said pressure-sensitive adhesive layer.
4. A package as claimed in claim 1 wherein said laminate of easily peelable tapes are formed by co-extruding synthetic resins.
5. A package as claimed in claim 1 wherein said laminate of easily peelable tapes are formed by thermal bonding.
6. A package as claimed in any of claims 1 - 5 wherein said laminate of easily peelable tapes protrudes farther into the package body than said heat-sealed portion of the package body.
7. A package as claimed in claim 6 wherein said laminate of easily peelable tapes has its inner end inside the package body covered by said heat-bonding layers.
8. A package as claimed in claim 1, further comprising a fastener member provided outside of said laminate of easily peelable tapes so as to be parallel to said laminate.
9. A package as claimed in claim 1, further comprising a fastener member provided inside of said laminate of easily peelable tapes so as to be parallel to said laminate.

FIG. 1

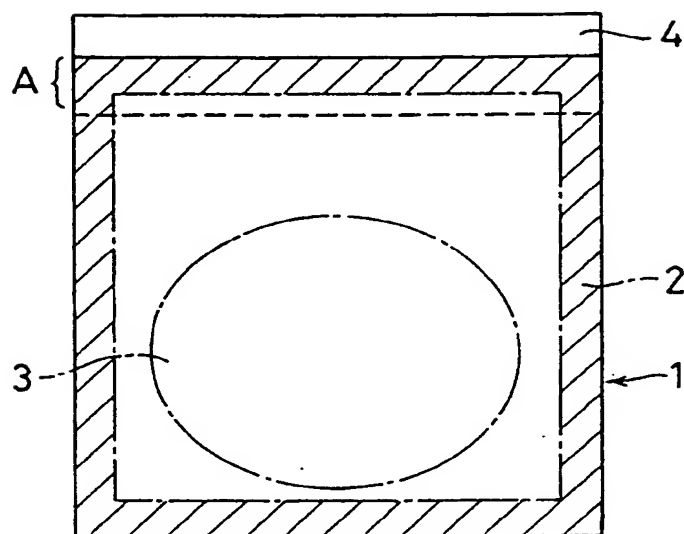


FIG. 2

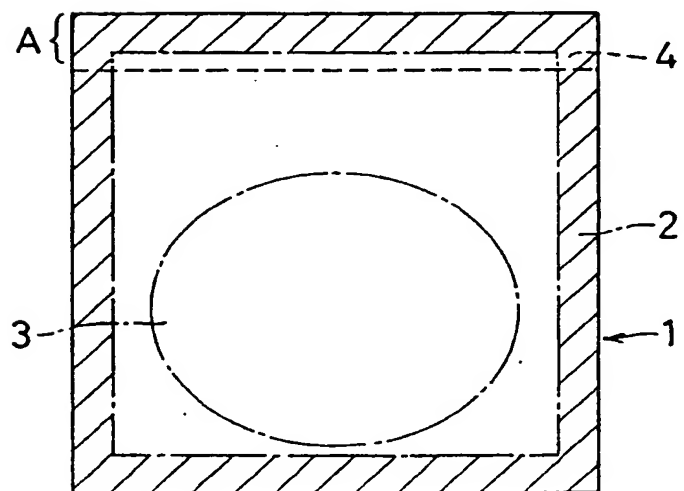


FIG. 3

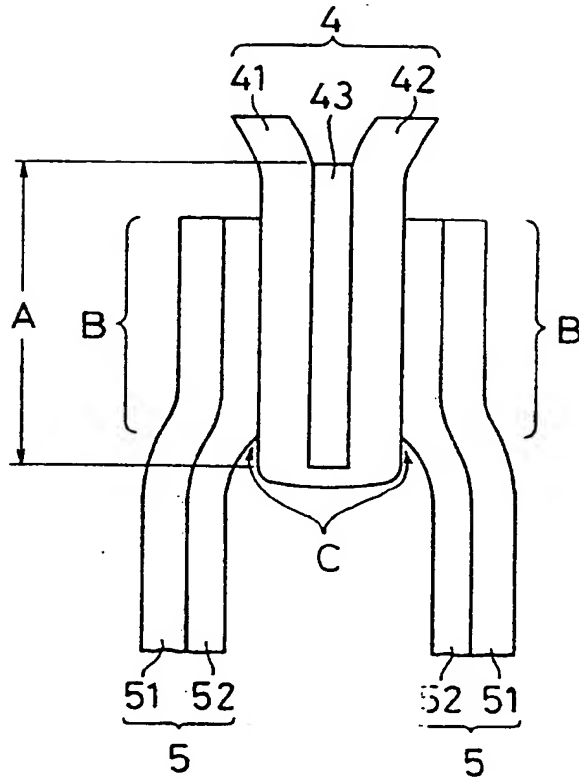


FIG. 4

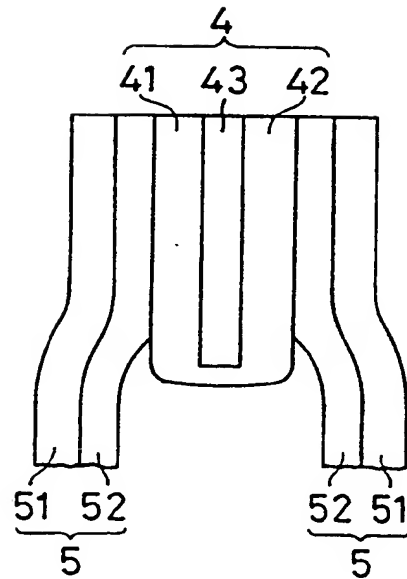


FIG. 5

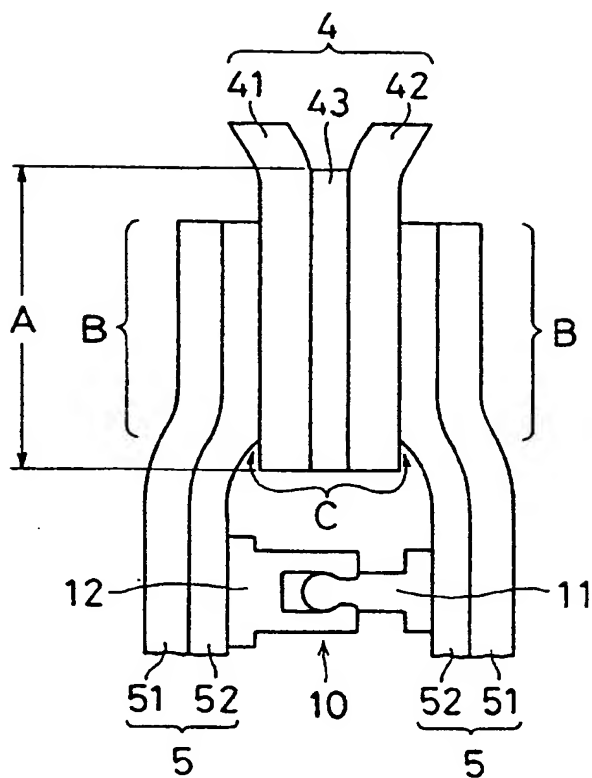


FIG. 6

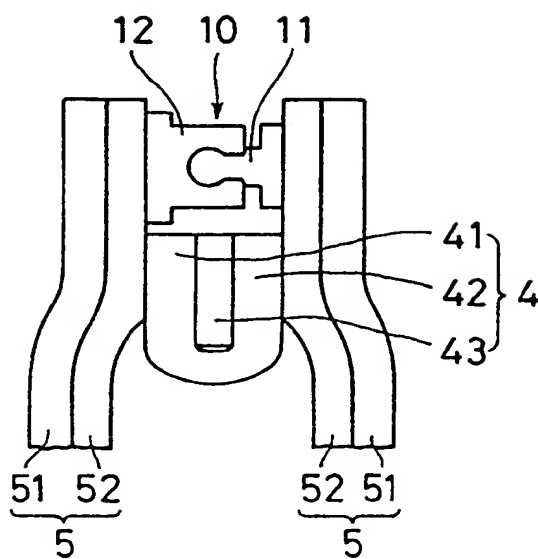


FIG. 7

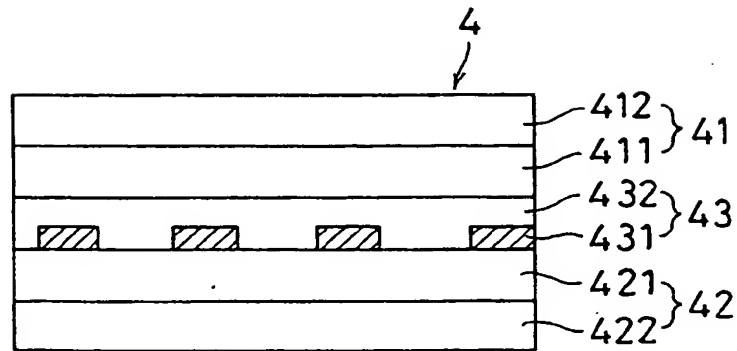


FIG. 8A

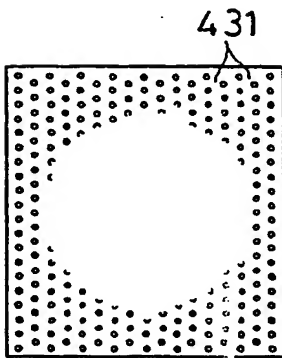


FIG. 8B

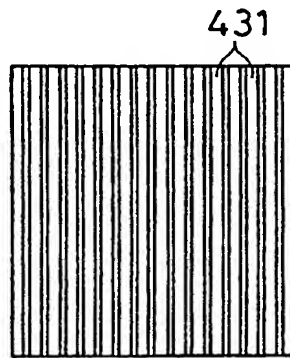


FIG. 8C

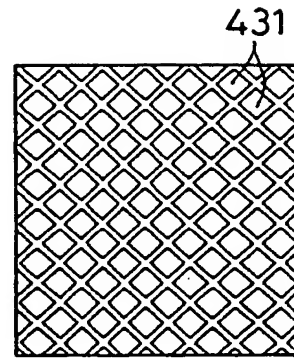


FIG. 9

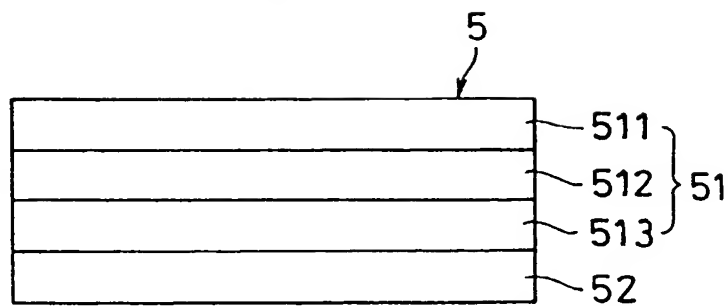


FIG. 10

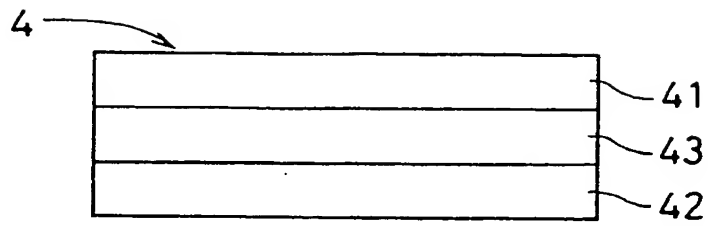


FIG. 11

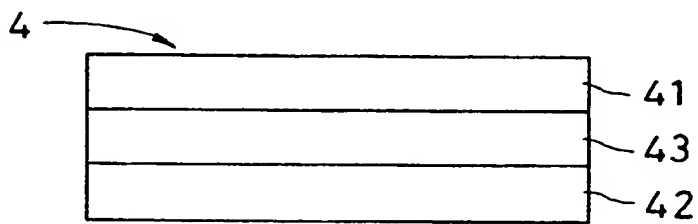
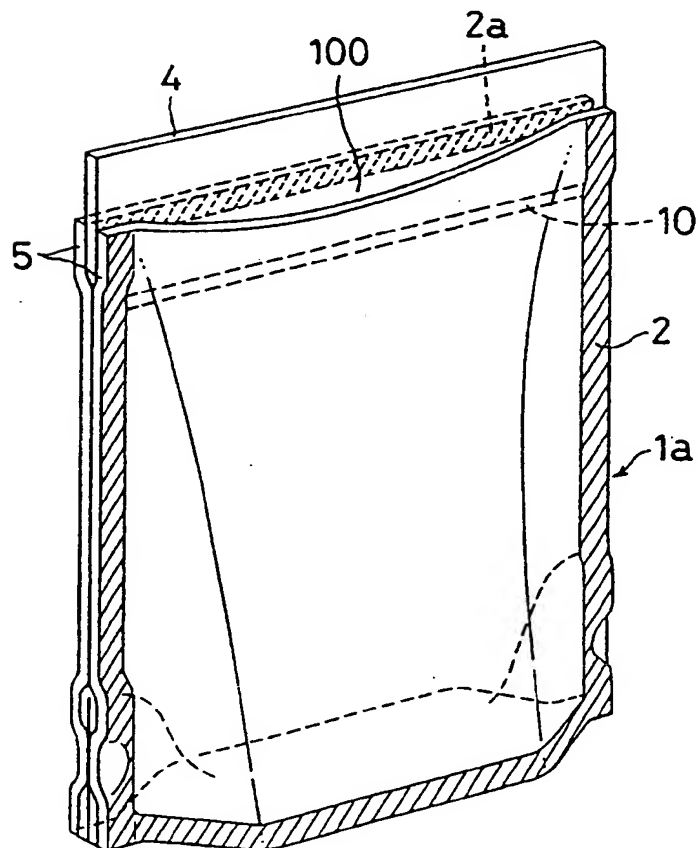


FIG. 12





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 92 11 8981

| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |  |   |
|--|---|--|---|
| Category   | Citation of document with indication, where appropriate, of relevant passages   | Relevant to claim  | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| X  | BE-A-570 672 (NICHOLS ET AL)<br>* page 1, paragraph 1 -paragraph 2 *<br>* page 3, paragraph 2; figures 5,6 *                                | 1  | B65D33/16<br>B65D33/34<br>B65D33/25           |
| Y  | ---   | 6,8,9  |   |
| Y  | US-A-4 905 298 (WALOR)<br>* column 2, line 15 - line 21 *<br>* column 3, line 56 - column 4, line 13;<br>figures 4,6 *                      | 6,8  |   |
| A  | ---   | 1  |   |
| Y  | EP-A-0 384 588 (OSCAR MAYER FOODS CORPORATION)<br>* column 4, line 37 - line 53; figures 1,2,4,10 *   | 9  |   |
| A  | ---   | 1  |   |
| A  | US-A-4 758 099 (BRANSON)<br>* column 2, line 24 - line 39 *<br>* column 3, line 52 - line 58 *<br>* column 4, line 51 - line 66; figure 7 * | 1,4,5  |   |
| A  | US-A-4 782 951 (GRIESBACH ET AL)<br>* column 4, line 20 - line 32; figure 6A *  | 1,7-9  |   |
| The present search report has been drawn up for all claims   |   |  |   |
| Place of search<br>BERLIN  |   | Date of completion of the search<br>07 JANUARY 1993  | Examiner<br>SPETTEL J.D.M.L.                  |
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